Amendments to the Claims

The Claim Listing below will replace all prior versions of the claims in the application:

Claim Listing

1. (Previously Presented) A variable-impedance active ankle foot orthosis comprising:

a device that modulates, by computer-controlled actuation, a joint stiffness or damping of an ankle joint in an updating manner at least three times during each walk cycle for treating an ankle foot gait pathology.

2. (Previously Presented) The device of Claim 1, wherein the device includes an actuator that modulates the joint stiffness of a torsional spring control.

3. (Previously Presented) The device of Claim 1, wherein the device includes an actuator that modulates the joint stiffness or damping of a spring-damper control.

4. (Previously Presented) The device of Claim 1, wherein the device includes an actuator that is coupled to a foot portion of the orthosis.

5. (Previously Presented) The device of Claim 1, wherein the device includes an actuator that is a series elastic actuator.

6. (Previously Presented) The device of Claim 1, wherein the orthosis includes an ankle angle sensor.

7. (Previously Presented) The device of Claim 1, wherein the orthosis includes one or more ground reaction force sensors.

8. (Previously Presented) The device of Claim 1, wherein the orthosis includes an actuator, an ankle angle sensor, one or more ground reaction force sensors, and a controller for controlling the orthosis.

9. (Previously Presented) The device of Claim 1, wherein the orthosis includes a foot switch.

10. (Previously Presented) The device of Claim 1, wherein the orthosis is used to treat drop foot gait.

11. (Previously Presented) The device of Claim 1, wherein the orthosis is used to treat a patient having anterior muscle weakness, posterior muscle weakness, or a combination thereof.

12. (Previously Presented) A device for treating an ankle foot gait pathology comprising:

an orthosis including an orthosis leg portion attachable to a leg of a person and an orthosis foot portion attachable to a foot of the person; and

a computer-controlled actuator configured to act on a spring to modulate joint stiffness or damping of the ankle joint in an updating manner at least three times during each walking cycle.

13. (Previously Presented) The device of Claim 12, wherein the actuator adjusts stiffness of the ankle joint by controlling the spring deflection during controlled plantar flexion to minimize forefoot collisions with the ground.

14. (Previously Presented) The device of Claim 12, wherein the actuator minimizes the joint stiffness or damping during late stance.

15. (Previously Presented) The device of Claim 12, wherein the actuator modulates the ankle joint stiffness or damping of a spring-damper control during a swing phase.

16. (Original) The device of Claim 12, further comprising an ankle angle sensor.

17. (Original) The device of Claim 12, further comprising one or more ground reaction force sensors.

18. (Original) The device of Claim 12, further comprising a controller for controlling the orthosis.

19. (Previously Presented) A method comprising modulating, by computer-controlled actuation, joint stiffness or damping of an ankle joint in an updating manner at least three times during each walking cycle.

20. (Previously Presented) The method of Claim 19, wherein the step of modulating the joint stiffness or damping of the ankle joint during walking further includes adjusting the ankle joint stiffness during controlled plantar flexion to minimize forefoot collisions with the ground.

21. (Previously Presented) The method of Claim 20, wherein the stiffness of the ankle joint is adjusted by use of a torsional spring control.

22. (Previously Presented) The method of Claim 19, further comprising minimizing the joint stiffness or damping during late stance.

23. (Previously Presented) The method of Claim 19, wherein the step of modulating the joint stiffness or damping of the ankle joint during walking further comprises modulating ankle joint stiffness, or damping, or both of a torsional spring-damper control during a swing phase.

24. (Previously Presented) A method of treating an ankle foot gait pathology using functional electrical stimulation, comprising:

applying computer-controlled electrical pulses to elicit muscle contractions to actively modulate ankle stiffness, or damping, or both during walking, wherein joint

stiffness or damping or both is modulated in an updating manner at least three times during each walking cycle.

25. (Previously Presented) A variable-impedance active ankle foot orthosis comprising:

a computer-controlled actuator and a spring operatively linked to the actuator, the actuator modulating a joint stiffness or damping of an ankle joint by controlling a spring compression in response to at least two sensed parameters during walking, the actuator modulating the joint stiffness or damping of the ankle joint by controlling the spring in at least two different modulation phases in an updating manner at least three times during each walking cycle in response to at least two sensed parameters.

26. (Previously Presented) The variable-impedance active ankle foot orthosis of Claim 1, wherein the device further includes a spring linked to an actuator, wherein the actuator modulates the joint stiffness or damping of the ankle joint.

27. (Previously Presented) The variable-impedance active ankle foot orthosis of Claim 26, wherein the actuator modulates the joint stiffness of the ankle joint by controlling stiffness of a torsional spring control.

28. (Previously Presented) The variable-impedance active ankle foot orthosis of Claim 27, wherein the actuator modulates the damping of the ankle joint by controlling damping of a torsional spring-damper control.

29. (Previously Presented) The method of Claim 19, further including the steps of operatively coupling a spring to an orthosis, and sensing one or more parameters of the orthosis during walking.

30. (Previously Presented) The method of Claim 29, wherein the joint stiffness or damping of the ankle joint is modulated by controlling the spring in response to the sensed parameters.

31. (Previously Presented) A method of treating an ankle foot gait pathology using functional electrical stimulation, comprising:

applying computer-controlled electrical pulses to elicit muscle contractions to actively modulate ankle stiffness, or, damping, or both in an updating manner at least three times during each walking cycle, the joint stiffness or damping further being modulated by controlling a spring associated with an orthosis.

32. (Previously Presented) The method of Claim 19, further including the steps of operatively receiving a parameter of a forefoot force signal during walking and modulating the joint stiffness or damping of the ankle joint in response to the parameter.

33. (Previously Presented) The method of Claim 24, wherein the electrical pulses actively modulate ankle stiffness during a stance period.

34. (Previously Presented) The method of Claim 24, wherein the electrical pulses actively modulate ankle stiffness of a torsional spring eontrol.

35. (Previously Presented) The method of Claim 24, wherein the electrical pulses actively modulate at least one of joint stiffness or damping during a swing phase.

36. (Previously Presented) The method of Claim 24, wherein the electrical pulses actively modulate at least one of joint stiffness or damping of a spring damper control during a swing phase.

37. (Previously Presented) A variable impedance active ankle foot orthosis comprising:

a device that modulates, by computer-controlled actuation, a joint stiffness or damping of an ankle joint wherein modulation of joint impedance is adaptive in nature, whereby information from each gait cycle causes further modulations that vary joint impedance from one gait cycle to the next.

38. (Previously Presented) A device for treating an ankle foot gait pathology comprising:

an orthosis including an orthosis leg portion attachable to a leg of a person and an orthosis foot portion attachable to a foot of the person; and

an actuator configured to act on a spring to modulate, by computer-controlled actuation, joint stiffness or damping of the ankle joint wherein modulation of joint impedance is adaptive in nature, whereby information from each gait cycle causes further modulations that vary joint impedance from one gait cycle to the next.

39. (Previously Presented) A method comprising modulating, by computer-controlled actuation, joint stiffness or damping of an ankle joint wherein modulation of joint impedance is adaptive in nature, whereby information from each gait cycle causes further modulations that vary joint impedance from one gait cycle to the next.

40. (Previously Presented) A variable impedance active ankle foot orthosis comprising:

an actuator and a spring operatively linked to the actuator, the actuator modulating, by computer-controlled actuation, a joint stiffness or damping of an ankle joint by controlling a spring compression in response to at least two sensed parameters during walking, the actuator modulating the joint stiffness or damping of the ankle joint by controlling the spring in at least two different modulation phases wherein modulation of joint impedance is adaptive in nature, whereby information from each gait cycle causes further modulations that vary joint impedance from one gait cycle to the next.

41. (Previously Presented) A method of treating an ankle foot gait pathology using functional electrical stimulation, comprising:

applying electrical pulses to elicit muscle contractions to actively modulate, by computer-controlled actuation, ankle stiffness, or, damping, or both wherein modulation of joint impedance is adaptive in nature, whereby information from each gait cycle causes further modulations that vary joint impedance from one gait cycle to the next.

the joint stiffness or damping further being modulated by controlling a spring associated with an orthosis.